Amendments to the Claims:

This listing of claims replaces all prior versions and listings of claims in the application:

Listing of Claims:

1. (Original) A method of monitoring a substrate having a metal layer during chemical mechanical polishing, the method comprising:

polishing a metal layer of a substrate with a polishing pad;

sweeping a sensor along a path across the substrate during the polishing step;

generating a sequence of sensor measurements from the sensor as the sensor sweeps along the path;

associating each of the sensor measurements with a radial position on the substrate;

dividing the sensor measurements into a plurality of radial ranges based on the radial positions; and

determining a characteristic of the metal layer for each radial range from the measurements associated with that radial range.

2. (Original) The method of claim 1, wherein polishing includes supporting the polishing pad on a support and moving the support relative to substrate.

3. (Original) The method of claim 2, wherein the sensor is secured to the support so that moving the support relative to the substrate causes the sensor to sweep along the path.

4. (Original) The method of claim 3, wherein the support comprises a platen and moving the support includes rotating the platen.

5. (Original) The method of claim 1, wherein generating a sequence of sensor measurements includes directing a light beam from the sensor to the substrate.

6. (Original) The method of claim 5, wherein generating a sequence of sensor measurements includes receiving a reflection of the light beam from the substrate to the sensor.

7. (Original) The method of claim 1, further comprising detecting a polishing endpoint using measurements from at least one of the radial ranges.

8. (Original) The method of claim 7, further comprising stopping chemical mechanical polishing when the endpoint is identified.

9. (Original) The method of claim 7, wherein detecting the polishing endpoint includes identifying a predetermined pattern from the measurements.

10. (Original) The method of claim 9, wherein the identifying step comprises comparing the measurements to a predetermined threshold.

11. (Original) The method of claim 9, wherein the sensor makes a plurality of sweeps across the substrate to generate a series of measurements.

12. (Original) The method of claim 11, wherein the identifying step comprises determining whether a series of measurements from the sensor have a downward trend.

13. (Original) The method of claim 11, wherein the identifying step comprises determining whether a series of measurements from the sensor have an upward trend.

14. (Original) The method of claim 11, wherein the identifying step comprises determining whether a series of measurements from the sensor have a flat trend.

15. (Original) The method of claim 1, wherein the associating step includes determining a time that the sensor crosses a midline of the substrate, and determining a position of the sensor at a measurement time from a difference between the measurement time and the time that the sensor crosses the midline of the substrate.

16. (Original) The method of claim 15, wherein the associating step includes determining a position of the carrier head from a carrier head sweep profile.

17. (Original) An apparatus for polishing a metal layer of a substrate, comprising:

a support to hold a polishing pad;

a carrier head to hold the substrate in contact with a surface of the substrate;

a motor coupled to the support to cause relative motion between the substrate and the polishing pad;

a sensor secured to the support to generate a sequence of sensor measurements as the sensor sweeps along a path; and

a computer configured to associate each of the sensor measurements with a radial position on the substrate, divide the sensor measurements into a plurality of radial ranges based on the radial positions, and determine a characteristic of the metal layer for each radial range from the measurements associated with that radial range.

18. (Original) The apparatus of claim 17, wherein the sensor includes a light source to generate a light beam directed to the substrate and a detector to detect a reflection of the light beam from the substrate.

19. (Original) The apparatus of claim 17, wherein the support comprises a rotatable platen.

20. (Original) The apparatus of claim 17, wherein the computer is configured to stop chemical mechanical polishing when an endpoint is identified.

21. (New) For use with a semiconductor wafer comprising a first surface and a second surface, wherein a first material is exposed at the first surface and wherein the first material underlies a second material, a method for detecting an exposure of the second material at the first surface of the semiconductor wafer during polishing, the method comprising:

(a) polishing the first surface of the semiconductor wafer with a polishing surface of a polishing device;

(b) transmitting light at the first surface of the semiconductor wafer through the polishing surface of the polishing device, wherein the first material at least partially reflects the transmitted light; and

(c) detecting a change in an amount of light reflected from the semiconductor wafer, the detected change indicating an exposure of the second material at the first surface of the semiconductor wafer.

22. (New) The invention of claim 21, wherein the light comprises infrared light.

23. (New) The invention of claim 21, wherein the polishing in (a) is performed by a rotating polisher.

24. (New) The invention of claim 21 further comprising:

(d) providing an indication that polishing endpoint has been reached.

25. (New) The invention of claim 21 further comprising:

(d) detecting polishing uniformity using the change in the amount of light detected in (c).